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CALIFORNIA DESERT AIR WORKING GROUP

DATA BASE STUDY

VOLUME 1 OF 7

REVISED CATALOGUE STRUCTURE AND EMISSIONS

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CALIFORNIA DESERT AIR WORKING GROUP (CDAWG) DATA BASE STUDY: REVISED CATALOGUE STRUCTURE AND EMISSIONS

1.0 INTRODUCTION

A revised catalogue of all reporting air quality and visibility sites in the California desert has been compiled; governmental and private sites are included. Some sites also report meteorlogical data. The revised catalogue aims to furnish, in one compilation, all useful information pertaining to each site and its data. In a previous catalogue site identification, site location, and periods for which specific data are available have been compiled (NWC, 1981). In this revision, information on data quality, representativeness, completeness, measurement method, and comparability between multiple methods are added. Details of the catalogue and rationale for the classification schemes are described here. Since emissions and meteorology are important pieces in the air quality puzzle, the available emission inventories for the California desert as well as the criteria for selection of meteorological sites in the National Weather Service network are discussed.

This report covers both Tasks 1 and 2 identified in the final contract. We have chosen to combine the two tasks into one report because it is easier and more efficient to address their objectives together.

2.0 CATALOGUE STRUCTURE: MAIN CATALOGUE

Details of the air quality, meteorological, and/or visibility monitoring sites in the California desert along with the details of the data collected at each site are catalogued here. Information is stored in each of 8 categories; comments are also included as needed. The details of the catalogue structure and the various codes used are described below. The first part of each page of the catalogue pertains to network and site information: description,

network purpose, site operation, contact person, and location. The latter part (in the table) provides variable information. The comments are at the bottom of each page.

Caveat Emptor. Although the main catalogue and the data base it complements borrows features - format, codes, etc. - heavily from standard practices of the California Air Resources Board (CARB), no official endorsement was sought from the agency and none is implied. Their features were used because data from CARB data bank form the major fraction of the data base.

2.1 Site Code and Address

All sites are identified by a 10 character alphanumeric site code. CARB site codes are used for CARB sites. They are preceded by a three letter prefix: ARB for CARB and EMS for other sites. SAROAD sites have not been included since SAROAD sites in the California desert are also CARB sites. The three letter prefix is followed by a 7 digit numerical code. For CARB sites, their 7 digit code is used. For other sites, the code is as follows: The first two numbers refer to the county; CARB's county numbers are used. The county codes for the California desert are

13 - Imperial County
14 - Inyo County
15 - Kern County
26 - Mono County
33 - Riverside County
36 - San Bernardino County
70 - Los Angeles County
99 - Non-California county

For sites out of state, mainly in Arizona or Nevada, a county code of 99 is used.

The next 2 numbers denote the agency responsible for the site:

00 - California Air Resources Board

01 - Southern California Edison

02 - Southern California Gas Company

03 - San Diego Gas and Electric

04 - NWC, China Lake

05 - Air Force Sites

06 - National Park Service

07 - EPRI

08 - National Weather Service (mainly for meteorological data)

09 - University run sites

10 - Lawrence Livermore Labs

11 - Department of Transportation (CALTRANS)

12 - EPA Las Vegas

13 - U.S. Army

14 - EPRI Western Regional Air Quality Studies

30 - Miscellaneous sites, e.g. individuals operating a site, etc.

This list covers all the agencies from which data were obtained; unused codes through 99 may be utilized to designate other agencies in the future.

The last three digits are for the site number.

The site codes are listed at the upper left of each page of the catalogue.

2.2 Operating Procedures

The operating procedures at each site are rated according to the following code:

ARB SOP - CARB's standard operating procedures (SOP);

EPA SOP - EPA/SAROAD standard operating procedures;

OTHER SOP - Other agency standard operating procedures;

NO SOP - No SOP used or information not available

2.3 Representativeness

Site representativeness depends on several factors and is assigned a 6-digit composite index. The first two digits pertain to data; digits 3 and 4 pertain to sampling; and the last two digits pertain to population and traffic information. The details of the index are given below:

Digit 1: 2 - Data available for all seasons
1 - Data not available for all seasons
0 - Information not available

Digit 2: 2 - At least one year's data available
1 - Less than one year's data available
0 - Information not available

Digit 3: Index for coding whether sampler probe satisfies EPA (or NWS for meteorological sampling) sampling criteria.
5 - Probes for all instruments satisfy EPA criteria
4 - Probes for 2/3 of instruments satisfy EPA criteria
3 - Probes for 1/2 of instruments satisfy EPA criteria
2 - Probes for 1/3 of instruments satisfy EPA criteria
1 - Probes for no instrument satisfy EPA criteria
0 - Information not available

Digit 4: 2 - Site thermal environment controlled
1 - Site thermal environment not controlled
0 - Information not available

Digit 5: Index to code population of locality of site, e.g., town, village, metropolitan area, etc. that has the dominating influence on the site.
4 - Population greater than 50,000
3 - Population between 10,000 and 50,000
2 - Population between 1,000 and 10,000
1 - Population less than 1,000
0 - Information not available

Digit 6: Index to code average daily traffic on the nearest street.
4 - Greater than 500 vehicles per day (VPD)
3 - Between 100 and 500 VPD
2 - Less than 100 VPD
1 - No public access road within 500 M of site
0 - Information not available

2.4 Site Location

The site location is defined by its latitude and longitude. The UTM coordinates as well as the township and ranges (where available) are also given. NOTE: All UTMS are in zone 11 except as noted.

2.5 Network/Site Contact

Information concerning the agency responsible for the network is given. Information on the sites in the network as well as the data collected at the site are usually available at this parent agency. Information includes (1) the person responsible in the agency, (2) the name and address of the agency, (3) a telephone number if available, and (4) the name and telephone number of a local contact person for each site if available and different from item 1.

2.6 Purpose of Monitoring and Site Classification

The purpose for which the monitoring was established is categorized by a 5-character composite index. The first two characters denote the purpose of monitoring; the third character (numerical) denotes the demographic location of the site; and the last two characters denote the dominating influence on the site. The details of the index are given below:

Monitoring purpose code (first 2 characters)

* AQ - Regulatory monitoring;

* AN - Non regulatory or other monitoring;

* RA - Air quality research

* RV - Visibility research

* RR - Other research

* BL - Base line studies

* QA - Quality assurance or audit

* PM - Permitting and/or compliance monitoring

* UK - Unknown monitoring purpose

Demographic location code (third character)

* 4 - City center/urban

* 3 - Suburban

* 2 - Rural

* 1 - Remote

* 0 - Unknown or information not available

Dominating influence code (last 2 characters)

* IN - Industrial

* RE - Residential

* CO - Commercial (non smokestack business)

* VE - Vehicular

* NU - Near urban; typically just outside urban area

* AG - Agricultural

* PA - Parks and recreational areas

* MI - Military

* AP - Airports

* SO - Natural source, usually dust, e.g., dry lake bed.

* UU - Unknown or unspecified

2.7 Number of Sites in Network

The number of sites in the network is coded. For a network extending beyond the California desert, e.g., California Air Resources Board's (CARB) air quality network, only the sites within the desert are considered to form a network.

2.8 Variable Information

Variable information is tabulated in the second part of each page in the catalogue.

All the variables for which data are available at each site are coded; a four character (maximum) label is used, e.g., SO_2, TSP, NO_x, etc. A complete list of variable labels is given in Appendix A. For each variable, the following information is provided (unavailable information is left blank):

Start and End dates between which data are available; end dates for currently operational sites are the latest date for which data are available, typically the last few months in 1983.

Completeness of available data coded as a percentage of possible data

available in the data base.

Sampling mode for the variable is coded as follows:

* Hourly data collection;

* Daily data collection;

* 24 hour data collected every sixth day (for TSP)

* Continuous data collection;

* Other data collection frequency (specified in comments, if known) or information not available.

Method code for the variable is coded according to the same method codes used by CARB. A complete list of method codes is given in Appendix B.

Method comparability is coded on a scale of 1 to 10, with 10 being best. All the methods used by CARB for each parameter are considered equivalent, and other methods are rated with reference to these equivalent methods. These methods rather than the EPA equivalent methods are used, since EPA equivalent methods are defined only for the criteria pollutants. The comparability code is assigned as follows:

10 - Same as the equivalent method.

1 to 9 - Ten times the published correlations between the reference mehtod and the method under consideration (rounded off to one significant digit)

0 - Comparability not available in open literature.

Data quality is rated by a 7-digit composite index. The first 2 digits pertain to the precision and accuracy standards; digits 3 and 4 pertain to data collection and processing; and the last 3 digits pertain to calibration and operation. The details of the index are given below:

Digit 1: 3 - Measurement precision better than $\pm$ 10%
2 - Measurement precision between $\pm$ 10 and 20%
1 - Measurement precision worse than $\pm$ 20%
0 - Measurement precision unknown

Digit 2: 3 - Measurement accuracy better than $\pm$ 5%
2 - Measurement accuracy between $\pm$ 5 and 10%
1 - Measurement accuracy worse than $\pm$ 10%
0 - Measurement accuracy unkonwn

Digit 3: 5 - Automatic data recording (usually data logger) and computer data processing

4 - Automatic strip chart/printout data recording and computer processing; this requires manual digitizing or input of data for processing.

3 - Manual data recording (by operator or operator controlled logger) and computer processing

2 - Manual data recording and processing; formal procedures and datasheets (usually for a special short duration study);

1 - Manual data recording and processing; informal procedure (usually for individual research type study).

0 - Information not available

Digit 4: Index to code the methods used for deleting erroneous data; data errors occuring due to any number of reasons: instrunment malfunction, unusual source, incomplete data logs,etc. Quality control means the deleting of data according to established formal or informal procedures.

3 - Manual data quality control per established criteria or SOP

2 - Automatic quality control per established criteria or SOP

1 - Informal manual data quality control

0 - No data quality control or unknown

Digit 5: 4 - Monthly calibrations or more often

3 - Between 4 to 12 calibrations yearly

2 - Less frequent than quarterly, but periodic

1 - Random

0 - No calibrations or information not available

Digit 6: 4 - Flow, zero, and system checks daily (or every day that measurements are made, e.g. 6th day for TSP)

3 - Flow, zero, and system checks at least weekly (Not applicable for TSP)

2 - Flow, zero, and system checks at least monthly

1 - Random checks or at breakdown only

0 - No system checks or information not available

Digit 7: 2 - Formal operator trainning per SOP or other document

1 - Informal training; no SOP

0 - No training or information unavailable

3.0 CATALOGUE SOFTWARE

The CDAWG catalogue is generated by a FORTRAN 77 program named PRTCAT. The raw data, such as site name, site number, etc. is contained in a data file (Appendix C). Changes to the catalogue are made by simply making changes, through the use of a file editor, to the raw catalogue data. Each parameter in the catalogue is coded with a six character code. A listing of all codes and their meaning will be included in the final program listing of PRTCAT. In order to produce the hardcopy of the catalogue, the user must have a DIABLO model 1640 or 1650 printer with the Word Processing option.

4.0 ADDITIONAL DATA REQUIREMENTS

In addition to the information included in the catalogue described above, the following additional data will be included in the data base.

4.1 Emission Inventory

Emissions are an important variable in air quality related investigations. For California, the only complete and up to date emission inventory is available from the California Air Resources Board and is dated 1979. Both point and area sources are included. A complete inventory is believed to be compiled every 4 years with the next one dated 1983 expected to be available in 1985. To ensure that the inventory to be included in this data base is current, the data will be corrected with the most current emission information. For this effort, the most recent updates of emissions submitted by local Air Pollution Control Districts to CARB will be utilized. However the information will only be preliminary, i.e., it would not be validated and reviewed by CARB. Nevertheless, since we will correct only major changes, our approach will result in an inventory that will be closer to the current values than the uncorrected 1979 data.

Alternate Approach. Since the 1983 inventory is expected soon, it may be advantageous to include the 1979 inventory as is at the present and replace it with the 1983 inventory when it is released. Since the format will be identical, this substitution will not affect the user and the 1983 inventory will be more accurate and valid than the 1979 data updated with preliminary data. In this alternate approach, arrangements will be made for obtaining the 1983 inventory from CARB soon after its release.

4.2 Meteorological Data

Meteorological data, particularly wind speed and direction, upper air data, and temperature are important for air quality related investigations. Meteorological data are included in some of the air quality data sites included in the catalogue. They are temporally and spatially incomplete with respect to the California desert. Hence, additional meteorological data will be included from the National Weather Service, which collects hourly data from nearly 30 stations in the California desert; some of them also have upper air data. Of these, data from only 10 sites will be included in the data base because of two reasons: cost and the availability of easy, direct access to all data via the Weather Service. Some stations were selected by their location in specific convergence zones, and others were selected to assure that we have provided data from all general areas of the desert. The Weather Service sites are listed below along with the periods for which data are available:

1. Bishop (1948-80)

2. China Lake (1945-80)

3. Cuddeback (1963-70)

4. Edwards Air Force Base (1949-70)

5. George Air Force Base (1950-70)

6. Needles (1948-64)

7. Blythe (1948-54, 1970-80)

8. Silver Lake (1948-50)

9. Thermal (1950-54)

10. Mojave (1955-58)

REFERENCE

California Desert Data Catalogue, Naval Weapons Center, China Lake, 1981.

Appendix A

ABBREVIATIONS OF PARAMETERS INCLUDED IN CDAWG CATALOGUE AND DATA BASE

VARIABLE	ABBREVIATION
WIND SPEED	WS
WIND DIRECTION	WD
RESULTANT WIND SPEED	REWS
RESULTAND WIND DIRECTION	REWD
UPPER WIND SPEED	UWS
UPPER WIND DIRECTION	UWD
VERTICAL WIND DIRECTION	VTWD
SIGMA FOR HORIZONTAL WIND DIRECTION	SHWD
SIGMA FOR VERTICAL WIND DIRECTION	SVWD
BAROMETRIC PRESSURE	PRES
STABILITY	STAB
TEMPERATURE	TEMP
DEW POINT	DEW
RELATIVE HUMIDITY	RH
PRECIPITATION	RAIN
SOLAR RADIATION	INSO
MIXING HEIGHT	MIXH
TOTAL SUSPENDED PARTICULATES	TSP
PARTICULATES	PART
SIZE SELECTIVE PARTICULATES:	
10 UM	PM10
15 UM	PM15

VARIABLE	ABBREVIATION
FINE	PMF
COARSE	PMC
NO SIZE SPECIFIED (BOTH)	SSI
SULFATES	SO4
NITRATES	NO3
ALUMINUM	AL
CADMIUM	CD
LEAD	PB
SILICON	SI
IRON	FE
ELEMENTAL CONCENTRATION	ELEM
HYDROGEN SULFIDE	H2S
OZONE	O3
TOTAL OXIDANT	TOX
CARBON MONOXIDE	CO
TOTAL SULFUR (UNFILTERED)	TSUL
SULFUR DIOXIDE	SO2
NITRIC OXIDE	NO
NITROGEN DIOXIDE	NO2
OXIDES OF NITROGEN	NOX
NON METHANE HYDROCARBON	NMHC
METHANE	CH4
BENZENE SOLUBLE ORGANICS	BSO
TOTAL HYDROCARBONS	THC
LIGHT SCATTER	BSCT
VISIBILITY	VISI
SOILING INDEX-COEFFICIENT OF HAZE	COH
SOILING INDEX-REFLECTANCE	RUD

Appendix B

METHOD CODE (PRELIMINARY)

METHOD CODE	METHOD OF POLLUTANT	METHOD OF COLLECTION	ANALYSIS	UNITS
91	TOTAL SUSP PARTICULATES	HI-VOL (GLASS FIBER)	GRAVIMETRIC	UG/M^3
91	TOTAL ORGANIC FRACTION	HI-VOL (GLASS FIBER)	BENZENE EXTRACTION	UG/M^3
81	SOILING INDEX	TAPE SAMPLER	TRANSMITTANCE	COHx10
91	SOILING INDEX	TAPE SAMPLER	REFLECTANCE	RUD
11	LIGHT SCATTER	INSTRUMENTAL	NEPHELOMETER	BSCAT
92	ALUMINUM	HI-VOL (CELLULOSE)		UG/M^3
92	CADMIUM	HI-VOL (CELLULOSE)	ATOMIC ABSORPTION	UG/M^3
55	LEAD	HI-VOL (CELLULOSE)	ATOMIC ABSORPTION	UG/M^3
56	LEAD	HI-VOL (GLASS FIBER)	X-RAY FLUORESCENCE	UG/M^3
92	LEAD	HI-VOL(GLASS FIBER)	ATOMIC ABSORPTION	UG/M^3
55	SILICON	HI-VOL (CELLULOSE)		UG/M^3
55	SUSPENDED NITRATES	HI-VOL (GLASS FIBER)	BRUCINE COLORIMETRIC	UG/M^3
57	SUSPENDED NITRATES	HI-VOL (GLASS FIBER)	MODIFIED SALTZMAN	UG/M^3
58	SUSPENDED NITRATES	HI-VOL (GLASS FIBER)	SPECIFIED ION ELECTROD	UG/M^3
59	SUSPENDED NITRATES	HI-VOL (GLASS FIBER)	2,4, XYLENOL	UG/M^3
55	SUSPENDED SULFATES	HI-VOL (GLASS FIBER)	METHYLTHYMOL BLUE	UG/M^3
92	SUSPENDED SULFATES	HI-VOL (GLASS FIBER)	TURBIDIMETRIC	UG/M^3
11	CARBON MONOXIDE	INSTRUMENTAL	NDIR	PPM
12	CARBON MONOXIDE	INSTRUMENTAL	NDIR-LONG PATH	PPM
16	SULFUR (TOTAL)	INSTRUMENTAL	FLAME PHOTOMETRIC	PPHM
13	SULFUR DIOXIDE	INSTRUMENTAL	CONDUCTIMETRIC	PPHM
14	SULFUR DIOXIDE	INSTRUMENTAL	COULOMETRIC	PPHM
15	SULFUR DIOXIDE			PPHM
16	SULFUR DIOXIDE	INSTRUMENTAL	FLAME PHOTOMETRIC	PPHM
20	SULFUR DIOXIDE	INSTRUMENTAL	PULSED FLUORESCENCE	PPHM
71	HYDROGEN SULFIDE	TAPE SAMPLER	LEAD ACETATE PAPER	PPHM
11	NITRIC OXIDE	INSTRUMENTAL	COLORIMETRIC	PPHM
14	NITRIC OXIDE	INSTRUMENTAL	CHEMILUMINESCENT	PPHM
51	NITRIC OXIDE	DERIVED	CHEMILUMINESCENT	PPHM
99	NITRIC OXIDE	DERIVED	COLORIMETRIC	PPHM
11	NITROGEN DIOXIDE	INSTRUMENTAL	COLORIMETRIC	PPHM
14	NITROGEN DIOXIDE	INSTRUMENTAL	CHEMILUMINESCENT	PPHM
96	NITROGEN DIOXIDE	DERIVED	CHEMILUMINESCENT	PPHM
11	OXIDES OF NITROGEN	INSTRUMENTAL	COLORIMETRIC	PPHM
14	OXIDES OF NITROGEN	INSTRUMENTAL	CHEMILUMINESCENT	PPHM
98	OXIDES OF NITROGEN	DERIVED	CHEMILUMINESCENT	PPHM

METHOD CODE	METHOD OF POLLUTANT	METHOD OF COLLECTION	ANALYSIS	UNITS
99	OXIDES OF NITROGEN	DERIVED	COLORIMETRIC	PPHM
11	TOTAL HYDROCARBONS	INSTRUMENTAL	FLAME IONIZATION DET.	PPM
11	TOTAL HYDROCARBONS	INSTRUMENTAL	FLAME IONIZATION DET.	PPTM
14	TOTAL HYDROCARBONS	INSTRUMENTAL	FLAME IONIZATION DET.	PPTM
14	NON-METHANE HC	INSTRUMENTAL	FLAME IONIZATION DET.	PPTM
14	METHANE	INSTRUMENTAL	FLAME IONIZATION DET.	PPTM
14	TOTAL OXIDANT	INSTRUMENTAL	COLORIMETRIC	PPHM
11	OZONE	INSTRUMENTAL	CHEMILUMINESCENT	PPHM
14	OZONE	INSTRUMENTAL	UV PHOTOMETRIC	$PPHM_3$
51	SIZE FRAC PARTICULATES	DICHOTOMOUS	15-2.4 GRAVIMETRIC	UG/M^3
52	SIZE FRAC PARTICULATES	DICHOTOMOUS	2.5-0 GRAVIMETRIC	UG/M^3
53	SIZE FRAC PARTICULATES	DICHOTOMOUS	2.5-10 GRAVIMETRIC	UG/M^3
57	SIZE SELC PARTICULATES	SIZE SELECTIVE HI-VOL	GRAVIMETRIC TOTAL 215	UG/M^3
58	SIZE SELC PARTICULATES	SIZE SELECTIVE HI-VOL	GRAVIMETRIC TOTAL	UG/M^3
52	SULFATES-SIZE SELECTIVE	SIZE SELECTIVE HI-VOL	TURBIDIMETRIC	UG/M^3

Appendix C

CATALOGUE INPUT DATA FILE (SAMPLE)

```
sitecd=ARB3600169
sitcon=Harry Dillon
siteph=(714) 339-4314
sitnam=Needles
sitad1=1800 Washington
sitad2=Needles, CA
repres=115020 (Representativeness)
comnt1=Atomic absorption for AL,SI,CD,Pb on Hi-vol (comments)
comnt2=filter. Date for SO2 unavailable.
PURNET=AQ3RE (Purpose of network)
 SITES=54
CONTCT=Fred Granum
AGENCY=ARB - Aerometric Data Branch
ADDRS1=1131 S Street
ADDRS2=Sacramento, CA  95814
PHONE =(916) 445-4765
OPPROC=1
analyt=TSP
DATQUA=0043442 (Data quality)
compcd=10 (Comparality code)
methcd=92 (Method code)
smpfrq=E (Sampling frequency. A-Hourly; B-Daily; C-Continuous;
                              D-Other; E-6th day.
stdate=7/72
endate=12/72
analyt=SULFATE
DATQUA=0043432
compcd=10
methcd=92
stdate=12/72
endate=12/72
smpfrq=E
analyt=COH
DATQUA=0043432
compcd=10
methcd=81
smpfrq=C
stdate=1/71
endate=6/73
```

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